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Cumulative Risk, The Home Environment, And Interactive Book Reading Between Mother And Child As Predictors Of School Readiness

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CUMULATIVE RISK, THE HOME ENVIRONMENT, AND INTERACTIVE BOOK READING BETWEEN MOTHER AND CHILD AS PREDICTORS OF SCHOOL READINESS

by

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CHAPTER 1: INTRODUCTION

School Readiness

School readiness has been defined as children's preparation to learn upon school entry (Lewit & Baker, 1995). Starting in the 1950s, there was an emphasis on cognitive skills as a benchmark of school readiness; however, when Head Start was introduced in 1965 a more holistic view of children and their readiness for school was developed (E. F. Zigler & Bishop-Josef, 2006). The founders viewed school readiness as being prepared across multiple domains, such as motivation, emotional development, health, cognitions, social development, and academic preparedness (Raver, 2003 ; Raver & Zigler, 1997 ; Zigler & Trickett, 1978 ; Zigler & Bishop-Josef, 2006). This multidimensional construct has expanded further and includes factors such as children's social, cognitive, and behavioral functioning, along with qualities of the family, the home environment, and the community (Blair, 2002). One aspect of school readiness is children's academic preparedness, including pre-reading knowledge, such as letter recognition, and pre-mathematics knowledge, such as familiarity with numbers (Snow, 2006). In addition to describing how prepared a child is for school entry, school readiness has also been shown to predict later school achievement (Duncan et al., 2007). Meta-analytic research by La Paro and Pianta (2000) found that early school readiness, measured by academic and cognitive performance, predicted later school performance, accounting for 25% of the variance. This summary of the existing literature demonstrates that school readiness is not only relevant for children's initial entry into school, but also has far reaching consequences for children's academic future.

There are a number of factors that predict school readiness. One factor is the accumulation of socio-demographic risks. A cumulative risk approach involves tabulating the

presence versus absence of multiple socio-demographic risks. Cumulative risk research has shown that the accumulation of multiple risks is associated with a greater likelihood for negative outcomes (Bennett, Weigel, & Martin, 2002; Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005; Oxford & Spieker, 2006; Sameroff, Seifer, Baldwin, & Baldwin, 1993). Socio-demographic risks associated with school readiness include maternal education, neighborhood disorder, household overcrowding, and single parenting (Kohen, Brooks–Gunn, Leventhal, & Hertzman, 2002). Moreover, the home environment has been shown to directly relate to school readiness outcomes (Forget-Dubois et al., 2009). In addition, the quality of the language interaction between mother and child during joint book reading is of noted importance (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Whitehurst et al., 1988). For example, research has shown that caregivers' book reading strategies predict children's vocabulary size (Blake, Macdonald, Bayrami, Agosta, & Milian, 2006; Fletcher, Cross, Tanney, Schneider, & Finch, 2008).

Interactive reading behaviors may account for the association between cumulative socio-demographic risk and school readiness. Therefore, a goal of the present study was to examine interactive reading between the mother and child as a mediator of the association between cumulative socio-demographic risk and school readiness in a sample of low-income mothers and their toddlers. In addition, the quality of the home environment was examined as a moderator of the relation between cumulative socio-demographic risk and school readiness.

Predictors of School Readiness

Socio-demographic factors play a critical role in school readiness. One socio-demographic variable with support as a predictor of children's school readiness is the age of the mother. Research has demonstrated that children of adolescent mothers perform more poorly on

tests of school readiness than children of older mothers (Baldwin & Cain, 1980; Furstenberg, Brooks-Gunn, & Chase-Lansdale, 1989). The current study recruited children of mothers who were twenty-one years or younger when the participating child was born; therefore, the participants all share the risk factor of being raised by young mothers. In addition to maternal age, there are numerous socio-demographic variables related to school readiness, such as maternal education, neighborhood dangerousness, social support, household overcrowding, and single parenting. Kohen et al. (2002) found that neighborhood factors, such as poverty, neighborhood disorder (i.e., condition of homes in neighborhood, people audibly arguing in the neighborhood), and number of homes lead by single females were negatively associated with children's verbal ability scores. In addition to neighborhood factors, higher levels of maternal education, and lower levels of household overcrowding were associated with children's higher verbal abilities in the study. Socio-demographic risks do not exist in isolation and children vary in the number of risks present at any given time in their lives.

It is often an accumulation of risk factors, rather than the presence of a single risk factor, that predicts children's developmental outcomes (Evans, Li, & Sepanski Whipple, 2013; Sameroff et al., 1993). Research has found that children with multiple risk factors (i.e., low birth weight, teenage mother, single parent, maternal depression, poverty) performed at lower levels on tests of school readiness than children with fewer risk factors (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Mistry, Benner, Biesanz, Clark, & Howes, 2010; Rouse & Fantuzzo, 2009). The accumulation of risks could be increasingly salient in samples that are already at risk due to minority status and maternal age. It is important to note, however, that there are children with multiple risk factors who are not delayed.

Home Environment and School Readiness

In addition to the family's socio-demographic circumstances, aspects of the more proximal home environment play critical roles as predictors of school readiness and language development. Research has shown that the home environment has a direct impact on school readiness (Forget-Dubois et al., 2009). Within the broader home environment is the more specific home learning environment, which includes frequency of book reading, encouraging language development and having learning materials present. Research by Rodriguez (2011) evaluated the home learning environment of over 1,800 mothers and their children at 15 months, 25 months, 37 months, and 63 months. Home learning environments were divided into six categories: low quality home environment that improved at the later time points, low quality home environment that declined over time, moderate quality home environment that improved over time, moderate quality home environment that declined, high quality home environment that declined over time, and high quality home environment that remained stable. The emergent literacy skills and vocabulary of the children were assessed at 63 months. The study found that children living in higher quality home learning environments beginning early in life had the highest vocabulary scores. This finding suggests that the quality of the home environment has early and lasting implications for children's development and, although a low quality home environment can have negative implications, a high quality home environment has positive implications for language development.

A high quality home environment has been found not only to be predictive of school readiness and language development in children, but has also been found to be a protective factor that reduces vulnerability to difficulties in academic domains. Research by Dubow and Luster (1990) found that an emotional and cognitively supportive home environment was associated with reductions in academic and behavior problems in at-risk children of young mothers. Thus, a

favorable home environment, even in the midst of numerous risk factors, can act as a protective factor reducing the likelihood of negative outcomes.

Research on the home environment often focuses on frequency of book reading. Meta-analytic research by Bus, van IJzendoorn, and Pellegrini (1995) included 29 studies that investigated the relationship between frequency of book reading between parent and child to outcome variables, such as emergent literacy, vocabulary knowledge and reading skills. Results from the meta-analytic research found that frequency of reading accounted for 8% of the variance in the literacy-related outcome measures. Although there is a great deal of research on the frequency and duration of time reading books to children, there is less research on the qualitative aspects of the home environment, such as the parental strategies used during reading interactions with their children.

Interactive Reading and School Readiness

There are numerous reading strategies that caregivers utilize when engaging in joint reading with their children. For example, parents often label, comment and ask questions while reading to their children (Bus, Belsky, van Ijzendoorn, & Crnic, 1997; Fletcher & Reese, 2005; Ninio, 1980). Many strategies have been found to be of noted importance during interactive reading (Morrow & Smith, 1990). These strategies include asking questions, scaffolding dialogue, praising the child, adding information, clarifying a topic, restating the information, leading discussion, sharing personal thoughts, and relating elements of the story to personal experiences. When employed, these strategies form the foundation of interactive reading, which is defined as reading between a caregiver and child that is conversational and involves the child by engaging the child in the process (DeBruin-Parecki, 2007).

The interactive reading strategies employed by caregivers have been found to relate to positive outcomes, such as children's language development and vocabulary size (Blake et al., 2006). Blake and colleagues observed both dual-parent and single parent book reading with their children aged 15 or 27 months. Parents' behaviors were coded in the book-reading task into 10 categories (i.e., label, comment, questions, imitations, relating, feedback). For the 27-month-old children, the researchers found that the number of questions and imitations asked by the parents were positively related to the children's vocabulary size. For both the 15 and 27-month-old children, parents' efforts to relate the story to the children's experiences positively correlated with vocabulary size. Labeling was most commonly used; however, it was negatively correlated with the children's language and vocabulary skills. Similarly, Fletcher et al. (2008) found parents' use of questions and expansions when children were 24 months to be positively related to children's expressive language at 30 months. In addition, the more the parents used strategies such as labeling, asking questions and expansions, the more their children maintained attention on the book. These research studies demonstrate the importance of parents' behaviors during book reading, beyond a report of number of books read to the children; though, prior studies often do not account for the children's temperament. Furthermore, previous research has established that access to learning materials and providing cognitively stimulating experiences mediates the relationship between multiple risk factors and outcomes such as school readiness (Bradley & Corwyn 2002; Brooks-Gunn, Klebanov, & Liaw, 1995; Guo & Harris, 2000). However, less research has focused on investigating the parents' behaviors during these cognitively stimulating experiences, such as during book reading, as a mediator of this relationship.

Current Study and Hypotheses

The at-risk sample in the present study includes young, low-income mothers and their toddlers. Data were collected at three time points. Cumulative socio-demographic risk was measured when the children were 18 months old. The home environment and interactive reading behaviors were collected when the children were 24 months old. Finally, a measure of school readiness was administered when the children were 36 months old.

In the current study, several variables were included as covariates and controlled for to account for these variables possibly predicting the school readiness outcome. The temperament of a child has been found to relate to school readiness (Blair, 2002; Coplan, Barber, & Lagacé-Séguin, 1999; McBryde, Ziviani, & Cuskelly, 2004). Self-regulation skills, including regulation of emotions and regulation of attention, are at the foundation of a number of behaviors and traits related to school readiness (Blair, 2002). In addition, teachers' and parents' perception of children's school readiness is influenced by aspects of children's temperament, such as their task persistence and inhibition (McBryde et al., 2004). Self-regulation skills and task persistence have been attributed to the larger construct of effortful control, which was included as a covariate in the present study (Putnam, Gartstein, & Rothbart, 2006).

Gender is another attribute of the child related to school readiness. There have been mixed findings in regards to gender and school readiness. Some existing research suggests that females show greater school readiness than males (Patterson, Kupersmidt, & Vaden, 1990). Other research has indicated that there are no consistent patterns of prediction of school entry skills based on the child's gender (Duncan et al., 2007). Though research has not clearly explained the ways in which gender contributes to school readiness, it appears to be an important factor to consider in research on school readiness. In addition, the mother's cognitive and verbal ability is another important factor in predicting school readiness. For example, research by

Oxford and Spieker (2006) found that lower maternal language ability predicted lower language scores in their children. Thus, the present study included the following covariates: the child's gender and temperamental effortful control, along with the mother's receptive language ability.

The present study examined several hypotheses related to cumulative socio-demographic risk, the home environment, interactive reading behaviors, and their interplay as predictors of school readiness. First, it was hypothesized that cumulative socio-demographic risk, the home environment and the interactive reading behaviors between mother and child would independently predict school readiness. Second, it was hypothesized that the interaction between cumulative socio-demographic risk and the home environment would predict school readiness such that a higher quality home environment would act as a moderator (see Figure 1). Specifically, higher quality home environments were hypothesized to buffer the link between cumulative socio-demographic risk and school readiness. Third, it was hypothesized that interactive reading behaviors would act as a mediator of the relationship between cumulative socio-demographic risk and school readiness (see Figure 2). Specifically, it was expected that the lower the cumulative socio-demographic risk the more interactive reading behaviors, which in turn would predict greater school readiness.

CHAPTER 2: METHOD

Participants

Participants were 104 adolescent and young adult mother-toddler dyads. The young mothers were recruited in Detroit, Michigan from Women, Infants, and Children (WIC) sites. WIC was used for recruitment because it provides health and nutritional support for low-income pregnant women, postpartum women, infants, and children who are at nutritional risk. To meet the longitudinal study's requirements, mothers had to have been 21 years or younger when they gave birth to the child participating in the study (*M* age at the initial study visit = 20.4 years, *SD* = 1.62). The majority of the sample was African American and low socioeconomic status. Participants lived in Detroit and the surrounding metropolitan area. The longitudinal study assessed the toddlers (males = 55, females = 49) at approximately 18 months (*M* age = 1.51 years, *SD* = 0.09), 24 months (*M* = 1.99 years, *SD* = 0.05), and 36 months (*M* age = 3.01 years, *SD* = 0.03). At time 1 (18 months), approximately 79% reported living in Detroit; at time 3 (36 months) that number had dropped to approximately 73% of the participants. Additionally, approximately 5% of the children were in daycare at time 1, about 10% were in daycare at time 2, and approximately 19% were in daycare at time 3.

Procedure

Data for the present study were collected at three separate time points from when the children were approximately 18 months, 24 months, and 36 months old. At 18 months, the mothers and their children were assessed in the Family Emotion Lab at Wayne State University in Detroit, Michigan. During the visit, mothers completed demographic information, numerous surveys, and computer tasks while trained research assistants supervised their children. Afterwards, mothers and their children were videotaped during a five-minute cleanup task. This

visit took approximately two hours to complete and participants were compensated $100. At 24 months, two trained research assistants visited the homes of the mothers and their children. Due to attrition, four mother-toddler dyads were not included at the second time point. In addition, two visits were conducted in the Family Emotion Lab because it was not possible to visit the participants' homes. The second visit was also approximately two hours long and participants were compensated $100. During this second visit, mothers completed demographic information and numerous surveys. In addition, mothers and their children were videotaped engaging in multiple tasks. The first task was a free play task where the children played with toys provided by the researchers while their mothers worked on the demographic survey with a research assistant. Next, mothers were instructed to have their children cleanup the toys. After, the mothers and children were videotaped while the children had no toys to play with and mothers worked on surveys. Then, the mothers and children participated in an interactive book reading task followed by interacting with three different toys presented separately in three bags. One hundred book-reading interactions were videotaped.

During the interactive book-reading task, the mothers were instructed as follows, "Now, we would like you and your child to look at this picture book together as you normally would. Notice that this book tells a story with pictures. Please be yourself. We want you to feel relaxed and comfortable. Parents have lots of ways of going through picture books with their young children and there are no right or wrong ways." The mothers were then handed *Goodnight Gorilla*, a children's picture book, and were videotaped for 5 minutes. Research assistants were instructed to refrain from using the word "read" when giving the task directions and when answering questions the mothers had about the task. Afterwards, mothers were administered the

Peabody Picture Vocabulary Test (PPVT-4), a measure of their receptive vocabulary.[1]

The third visit, when the toddlers were approximately 36 months, also took place in the participants' homes. In addition to assessing the mothers and their toddlers, an alternative caregiver (i.e., father of the child, grandparent) also completed an assessment of the child's behavior. At time three, the visits took approximately one and a half hours to complete; mothers were compensated $50 and alternative caregivers were given $5 for completing one survey. Due to attrition, 16 mother-child dyads were not included at this time point. At the visit, mothers completed demographic information and numerous surveys. Additionally, mothers and their children were videotaped during multiple tasks including a free play task and cleanup task that were identical to the tasks in the previous home visit. Furthermore, the mothers and children were videotaped while the mothers were instructed to work on surveys and the children were to wait without access to toys and with a cookie in sight. At the end of the tasks, the lead research assistant administered a measure of school readiness to the children.[2]

Measures: Covariates

Early Childhood Behavior Questionnaire**.** A short form of the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006) was used to assess the children's temperament at 18 months old. The ECBQ is a parent report and it measures 18 dimensions of the temperament of a child between 18 and 36 months old. The 18 scales include Activity Level, Attention Focusing, Fear, Frustration, High- and Low-intensity Pleasure, Perceptual Sensitivity, Positive Anticipation, Sadness, Soothability, Affiliation/Cuddliness, Discomfort, Impulsivity, Inhibitory Control, Shyness, Attention Shifting, Motor Activation, and Sociability. Internal

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[1] Twenty-four mothers completed the PPVT-4 at the 36-month visit because the PPVT-4 was added to the protocol midway through the age 24-month data collection.
[2] Of the 84 school readiness assessments that were administered, three were excluded; one due to an administration error and two due to perceived significant developmental delays.

consistency for the 18 scales ranged from an alpha of .73 and .89, with the majority of the alphas over .80 (Putnam et al., 2006). Within these 18 dimensions are three factors: Surgency/Extraversion, Negative Affectivity, and Effortful Control. Effortful Control includes scores on Inhibitory Control, Attention Shifting, Low-intensity Pleasure, Cuddliness, and Attention. For the purpose of the present study Effortful Control is considered as a covariate. The short form (ECBQ-S) condensed the original form from ten pages (201 items) to five pages (107 items), while maintaining all the original temperament scales. Examples of items include, "While looking at picture books on his/her own, how often did your child become easily distracted?" and "During everyday activities, how often did your child easily shift attention from one activity to another?" Items in the scale were rated on a scale from 1 (*Never*) to 7 (*Always*), with an additional rating of NA (*Does not apply*) available if the mother did not see the child in the situation in the last two weeks.

Peabody Picture Vocabulary Test – 4th Edition. The Peabody Picture Vocabulary Test (PPVT-4; Dunn & Dunn, 2007) was used to measure the receptive verbal language abilities of the mothers. For each item, the examiner asks the mother to point to the picture that best illustrates the word that is being tested. Four images are presented for every item administered. The items sample words that represent twenty content areas, such as vegetables and tools, and parts of speech, such as nouns and verbs. The test is individually administered and it takes between 10-15 minutes. Standard scores are obtained with a mean of 100 and a standard deviation of 15. The prior version of the PPVT has been found to correlate with intelligence quotient (IQ) ranging from .70 to .90 and correlates with verbal ability from .81 to .91 (Dunn & Dunn, 1997).

Measures: Socio-demographic risk at age 18 months

Maternal education. Maternal education was assessed by asking the mothers, "What is the last level of formal education that you have completed?" This item was rated on the following scale: 1 (*No formal schooling: 0% met criterion*), 2 (*7th grade or less: 0% met criterion*), 3 (*Junior high completed: 1% met criterion*), 4 (*Partial high school; at least one year: 21.2% met criterion*), 5 (*High school graduate/GED certificate: 33.7% met criterion*), 6 (*Partial college; at least one year or specialized training: 30.8% met criterion*), 7 (*Junior college/associates degree: 10.6% met criterion*), 8 (*Standard college or university degree: 2.9% met criterion*), and 9 (*Graduate professional training or graduate degree: 0% met criterion*).

Neighborhood dangerousness. Neighborhood dangerousness was measured with the Me and My Neighborhood Questionnaire (MMN; Trentacosta, Hyde, Shaw, & Cheong, 2009). Portions of this measure were adapted from the City Stress Inventory (Ewart & Suchday, 2002). Eighteen items were used to assess stressful events the participants experienced in the past year in their neighborhood. Example items include, "A family member was robbed or mugged," "I saw people dealing drugs in my neighborhood," and "I heard adults arguing loudly on my street." The 18 items (*M* = 30.37, *SD* = 9.66) were rated on a scale from 1 (*never*) to 5 (*often*). For the current study, the Neighborhood Dangerousness scale had an internal consistency of α = .89.

Social support. Social support was measured with the Inventory of Parent's Experiences (IPE; Crnic, Greenberg, & Slough, 1986). Eight items were used to assess how satisfied the mothers felt about situations related to their community. For example, the mothers rated how satisfied they were their neighborhood involvement, they rated their satisfaction with how much they talk on the phone with friends or family, and they rated their satisfaction with how many times they have visited with friends, to name a few. The eight items (*M* = 26.38, *SD* = 4.30) were

rated on a scale from 1 (*Very dissatisfied; I wish things were very different*) to 4 (*Very satisfied; I'm really pleased*). For the current study, the satisfaction with social support scale had an internal consistency of α = .79. The measure of social support was negatively skewed (skew = -1.23). This variable was transformed using a negative square root transformation to reduce skew while maintaining interpretability (skew = -0.22).

Single parenting. During the demographic interview, the mothers reported on who lived in the home, including all adults and children present. Single parenting was a dichotomous variable, which was defined as whether the mother was the only adult in the home or whether there were other adults present.

Household overcrowding. Household overcrowding was determined by subtracting the number of rooms in the home (not counting bathrooms or hallways) from the number of people living in the home. See Figure 3 for graph of frequencies. Overcrowding was defined as more people in the home than rooms.

Cumulative socio-demographic risk. The cumulative socio-demographic risk was generated from the five socio-demographic factors described above: (1) low maternal education, (2) neighborhood dangerousness, (3) low social support, (4) household overcrowding, and (5) single parenting. To generate the index, the five factors were dichotomized (1 = *risk factor present*; 0 = *risk factor absent*) and then summed. Low maternal education was defined as less than a high school diploma or GED (1 = < *High School/GED;* 22% of mothers met this criterion). Neighborhood dangerousness was determined by scoring the Me and My Neighborhood Questionnaire and defining the upper quartile as "risk" (1 = *37pts - 62 pts*; 0 = *17pts - 36pts;* 25% of mothers met this criterion). Low social support was determined by scoring the Inventory of Parent's Experiences (IPE; Crnic, Greenberg, & Slough, 1986) and defining the

bottom quartile as "risk" (1 = *9pts – 24pts*; 0 = *25pts – 32pts*; 29% of mothers met this criterion)

Transformation of this variable did not change rank order. Household overcrowding was

determined by comparing the number of people living in the home to the number of rooms in the

home (not counting bathrooms or hallways), with more people in the home than total rooms

present (a value greater than zero) considered a risk factor (1 = *people in home > rooms in home;*

18% of mothers met this criterion). Single parenting was defined as whether the mother was the

only adult in the home or whether there were other adults present (1 = *mother is the only adult in*

the home; 23% of the mothers met this criterion). Cumulative socio-demographic risk was

computed as the total number of risk factors experienced by each participant. Thus, the

cumulative risk index could range from 0 (*no risk factors present*) to 5 (*5 risk factors present*).

Measures: Home environment and interactive reading at age 24 months

Home Observation for Measurement of the Environment. An adapted version of the

Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984)

was used to measure the quality of the child's home environment. In addition, it assesses the

family environment and parenting abilities. The research assistants completed the inventory after

the home visit was completed and prior to returning to the lab. For the purposes of this study, a

shortened version of the HOME was completed with a total of 21 behaviors assessed. Each item

was either endorsed with the answer "yes" or "no" indicating whether the behavior in question

was observed. Scores of "yes" indicated a positive aspect of the home environment. The

shortened measure included 11 items assessing responsivity. This factor measured how much the

mother responded to the child (e.g. "Parent responds verbally to child's vocalizations or

verbalizations"). In addition, there were seven items assessing acceptance. This factor measured

how much the mother accepted a child's behavior and avoided unnecessary punishments (e.g.

"Parent does not shout at child," "At least ten books are present and visible"). Finally, the measure included three items that assessed involvement. This factor measured how much the mother provided a stimulating learning environment (e.g. "Parent talks to child while doing household work"). A total score was obtained, which includes the 21 items from the three scales as a single measure. For the current study, the HOME had an internal consistency of $\alpha = .59$.

Adult-Child Interactive Reading Inventory**.** The Adult-Child Interactive Reading Inventory (ACIRI; DeBruin-Parecki, 2007) was used to measure the behaviors of the mothers and children simultaneously as they interacted in a book reading task. The tool provides a coding system to measure interactive reading behaviors between the dyad. ACIRI contains three main categories of behaviors that are coded, including Enhancing Attention to Text, Promoting Interactive Reading and Supporting Comprehension, and Using Literacy Strategies. Within each category, four behaviors that have been found in the literature to support good reading practices are coded for the mother. Thus, twelve behaviors total were coded for the mother. Each behavior received a score of 0 (*no evidence*), 1 (*infrequently/ 1 time*), 2 (*some of the time/ 2-3 times*), or 3 (*most of the time/ 4 or more times*). The first category, Enhancing Attention to Text, contains behaviors where the mother gains and increases the child's attention. The four behaviors within this category include remaining physically close to one another during the task, sustaining attention, holding the book, and creating a sense of audience when interacting with the child. The second category, Promoting Interactive Reading and Supporting Comprehension, contains behaviors that encourage reading comprehension. The four behaviors within this category include asking questions, labeling, relating the story to the child's personal experiences, and answering questions. The third category, Using Literacy Strategies, contains behaviors that help to teach children how to read. The four behaviors within this category include utilizing

pictures and repetitive phrasing to assist in understanding the story, asking children to predict what will happen next, asking children to recall information from the story, and offering additional ideas. Two coders were trained with the ACIRI manual (DeBruin-Parecki, 2007). After training was complete, the coders worked independently to code the videos. The third category, Using Literacy Strategies, was excluded from further analyses due to the low observance of the four behaviors in this category ($M = .18$, $SD = .32$). Thus, a total score was obtained for the mothers, which included the eight items from the two categories as a single measure. Twenty six percent of the videos were coded for reliability. Intraclass correlations (ICCs) based on a two-way random effects model were computed for the first category (Enhancing Attention to Text: $M = 2.52$, $SD = .61$), the second category (Promoting Interactive Reading and Supporting Comprehension: $M = 1.40$, $SD = .46$) and finally the overall book reading task, which included both the first and second category ($M = 1.96$, $SD = .49$). ICC interrater reliabilities for the first category, second category, and overall book reading task were .91, .97, and .96, respectively.

Outcome measure at age 36 months

The Bracken School Readiness Assessment − Third Edition (BRSA-3; Bracken, 2007) was used to measure the children's school readiness in the categories of colors, letters, numbers, counting, sizes, comparisons, and shapes. The measure includes five subtests. The concepts evaluated have been found in literature to be relevant for a child's entry into formal education. The BRSA-3 is individually administered to the child. The examiner asks the child to point to images that demonstrate the concept; thus, it is a receptive measure. The BRSA-3 can be administered to children from 3 years, 0 months to 6 years, 11 months. The test takes approximately 10-15 minutes to administer. Standard scores are obtained with a mean of 100

and a standard deviation of 15. In a standardization sample, test-retest reliability for ages 3 years, 0 months through 4 years, 11 months was an alpha of .92 and internal consistency for ages 3 years, 0 months through 3 years, 5 months was an alpha of .95 (Bracken, 2007).

CHAPTER 3: RESULTS

Preliminary Results

Means and standard deviations for the study measures and variables can be found in Table 1. Overall, participants had relatively low scores on the cumulative socio-demographic risk index (averaging between 1 and 2 risks). Additionally, the mean score of the mothers on the PPVT-4 (M = 80.50, SD = 12.50) fell in the Moderately Low Score range. Similarly, the mean score of the children on the BRSA-3 (M = 80.60, SD = 14.48) fell in the Delayed range. The mean total interactive book reading score was moderately high (M = 1.96, SD = 0.49). Variables were also inspected for normality. The measure of school readiness was mildly positively skewed (skew = 0.96). In contrast, the measure of the total interactive book reading score was negatively skewed (skew = -1.74). This variable was transformed using a negative log 10 transformation to reduce skew while maintaining interpretability (skew = -0.72). All other variables were relatively normally distributed. For all regression analyses there was an N of 81.

Bivariate correlations between study variables were examined (see Table 2). First, bivariate correlations between the individual socio-demographic risk factors and overall cumulative socio-demographic risk index were examined. The cumulative socio-demographic risk index was significantly positively correlated with neighborhood dangerous, single parenting and household overcrowding. In contrast, the cumulative socio-demographic risk index was significantly negatively related to social support and the education level of the mother. Additionally, neighborhood dangerousness was significantly negatively correlated to both social support and household overcrowding. The other individual risks were not significantly correlated. One of the advantages of a cumulative risk index is that the risks do not need to significantly correlate with each other to form a meaningful index of risk (Evans et al., 2013).

Next, bivariate correlations between the measure of children's school readiness and the other study variables were examined. The measure of school readiness was not significantly correlated with the predictors (cumulative socio-demographic risk, the home environment, total interactive book reading strategies) nor was it significantly correlated with the covariates (children's gender and effortful control, and mothers' receptive verbal ability). However, the measure of school readiness was significantly negatively correlated with being a single parent, one of the variables in the risk index. An independent samples t-test demonstrated that there was a significant difference in the mean scores on the measure of school readiness between single parent homes ($M = 74.05$, $SD = 8.30$) and homes with other adults living there ($M = 82.61$, $SD = 15.40$; $t(79) = -2.32$, p < .05).

The total interactive book reading score was significantly negatively related to single parent status. An independent samples t-test revealed that there was a significant difference in the mean scores between single parent homes ($M = 1.78$, $SD = 0.70$) and homes with other adults living there ($M = 2.01$, $SD = 0.39$) on the total interactive book reading behaviors; $t(98) = -2.08$, p < .05. In contrast, the total interactive book reading score was significantly positively related to maternal education. An independent samples t-test demonstrated that there was a significant difference in the mean scores between mothers with a high school diploma, GED or higher ($M = 2.02$, $SD = 0.42$) and those with less than a high school diploma or GED ($M = 1.73$, $SD = 0.63$) on the total interactive book reading behaviors; $t(98) = 2.53$, p < .05.

Mothers' receptive verbal language ability was significantly positively correlated with the measure of the home environment and significantly negatively related to household overcrowding. Effortful control was significantly positively related to gender. Results from an independent samples t-test demonstrated that there was a significant difference in the mean

scores between males (M = 4.61, SD = .57) and females (M = 4.86, SD = .59) on the measure of effortful control; $t(102)$ = 2.24, p < .05.

Hypothesis #1: Main Effects

A linear regression was conducted in order to test the hypothesis that lower levels of cumulative socio-demographic risk, higher quality home environment and higher levels of interactive reading behaviors each significantly predict school readiness outcome. The cumulative socio-demographic risk index, home environment (measured with the HOME), and interactive reading behaviors (coded with ACIRI) were the independent variables, and school readiness measured with the Bracken was the dependent variable. Child's gender and temperament, and maternal receptive language were included as covariates. As shown in Table 3, cumulative socio-demographic risk, the home environment, and interactive book reading behaviors did not significantly predict children's school readiness.

Hypothesis #2: Moderation

Next, hierarchical regression analysis was conducted in order to test the hypothesis that the home environment would act as a moderator between cumulative socio-demographic risk and school readiness while controlling for the covariates (child's gender, temperament, and maternal receptive language). The cumulative socio-demographic risk index, and home environment were centered prior to creating interaction terms and conducting this analysis. In the first step of the equation, the covariates were entered. Next, the cumulative socio-demographic risk index, and home environment variables were entered as predictors of children's school readiness scores. The interaction between cumulative socio-demographic risk and the home environment were entered into the final step of the equation. It was expected that that higher levels of the home environment would attenuate the expected negative association between cumulative risk and

children's school readiness. Results of this hierarchical regression are summarized in Table 4. The interaction between the home environment and cumulative socio-demographic risk was not significant.

Hypothesis #3: Mediation

In order to test the third hypothesis, multiple steps were conducted to test for the mediating effect of interactive reading behaviors on the relationship between cumulative socio-demographic risk and a measure of school readiness while controlling for the covariates (Baron & Kenny, 1986). First, multiple regression was run to test whether cumulative socio-demographic risk predicted scores on school readiness. The results were not significant ($\beta = .02$, $p = .83$). Second, multiple regression was run to test whether cumulative socio-demographic risk predicted interactive reading behaviors. The results of this regression were not significant ($\beta = -.17$, $p = .10$). Given that there were no significant main effects there was insufficient support to indicate that interactive book reading behaviors mediate the relationship between cumulative socio-demographic risk and scores on school readiness.

CHAPTER 4: DISCUSSION

This study investigated the relationships between cumulative socio-demographic risk, the home environment, interactive reading behaviors of mothers, and school readiness in children. The three main hypotheses were not supported. First, it was examined whether lower levels of cumulative socio-demographic risk, higher quality home environment and higher levels of total interactive reading behaviors each significantly predicted the school readiness outcome. Contrary to findings in previous research, this study did not find a significant relationship between cumulative socio-demographic risk, the home environment, interactive book reading, and the children's score on a measure of school readiness. This may partially be explained by the relatively homogenous sample. The sample consisted of young mothers, recruited from a single urban setting, and the majority of the sample was ethnic minority. This contributed to less variability, which could be seen in the measures used in analyses. For example, on the measure of school readiness, 68% of the children fell in the Very Delayed to Delayed range. On the measure of maternal verbal ability, 59% of the mothers fell in the Extremely Low to Moderately Low range. The lack of variability likely impacted prediction and influenced the observed non-significant relationship between cumulative socio-demographic risk factors, interactive reading behaviors, the home environment, and school readiness.

Furthermore, the mean of the children's scores on the Bracken, a measure of school readiness, fell in the Delayed range. One explanation for the low scores might be a floor effect, which is most common among the lowest-age levels of a test, such as the Bracken (Bracken, 1988). In the case of the present study, the majority of the children were assessed at 3 years 0 months, which is the earliest the Bracken can be administered. Thus, the test was administered at the lowest-age level of the test, which might have impacted measurement. Interestingly, the

mothers' scores on the PPVT-4, the covariate that measured verbal ability, similarly fell in the Moderately Low Score range. These findings together call into question whether cultural bias in the tests was also a factor. For example, it is possible that the content of a test like the PPVT-4 is not as relevant to urban African American mothers, thus the test might underestimate their true abilities. Another possible explanation might be that this sample of mothers with lower socioeconomic status has less access to resources, such as learning materials that foster the pre-academic knowledge (i.e., numbers, colors, shapes), which are assessed on a test like the Bracken (Duncan & Magnuson, 2005).

Previous research comparing ethnic differences in test scores of African American and Caucasian mothers and their children found similarly low maternal verbal scores on the PPVT of the African American mothers (Brooks-Gunn, Klebanov, & Duncan, 1996). Likewise, the African American children in the study scored lower on several cognitive measures, which did not include the Bracken specifically. The study found that adjustments for social and economic differences, such as family and neighborhood poverty, maternal education, and rates of single parenting, all but eliminated the disparity in these scores between the ethnic groups. Another study, which compared scores on the Bracken of three-year-old African American and Caucasian children, found the Caucasian children scored significantly higher even when controlling for SES (Dotterer, Iruka, & Pungello, 2012). The average standard score of the African American children in the study ($M = 93.50$) was higher than the average standard score in the present study ($M = 80.60$), but was still lower than what would be expected based on norms. Though care was taken in the standardization of both the PPVT and the Bracken to remove bias and use a representative sample in standardization, future studies might explore possible cultural biases of

the tests and whether the scores are equivalent across cultures (Bracken, 2007; Dunn & Dunn, 2007).

The current study also examined whether a higher quality home environment would attenuate the expected negative association between cumulative socio-demographic risk, and children's school readiness. Previous research has indicated that the home environment acts as a protective factor, reducing the impact of risk factors on academic performance (Dubow & Luster, 1990). In the current study, a higher quality home environment did not moderate the relationship between cumulative socio-demographic risk and school readiness. A possible explanation for the lack of support for this hypothesis is that a shortened version of the HOME measure was used in the present study. The full version, which includes more items related to the home learning environment, might have improved prediction and strengthened the association between the home environment, cumulative socio-demographic risk and the children's school readiness.

Additionally, the current study tested for the mediating effect of interactive reading behaviors on the relationship between cumulative socio-demographic risk and school readiness. There was no support for interactive reading behaviors as a mediator as there were no significant main effects found. Though there was no support for mediation, the book-reading task was reliably coded and it was found that the mothers used the interactive reading behaviors at a comparable rate to similar samples. For example, in comparison to a study that used the ACIRI system to code interactive reading behaviors of Mexican American mothers from low and middle socioeconomic status and their toddlers, the present study had a similar overall mean (Rodriguez, Hines, & Montiel, 2009). Moreover, the Using Literacy Strategies category, which was eliminated from further analyses in the present study due to low occurrence had a similarly low

mean in the study investigating the Mexican American mother-child dyads. Furthermore, in the statistical support provided in the ACIRI manual, a book reading task was coded using ACIRI with a sample of mother-child dyads recruited from an Even Start program for high-risk families (DeBruin-Parecki, 2007). The children ranged from two to seven years old, with the majority being between three and four years old. Here again, the present study found a similar overall mean than this high-risk sample presented in the manual. These studies suggest that the sample in the present study is using similar, if not slightly more interactive reading strategies than other at-risk mother-child dyads that have been studied; however, the present study did not measure reports of frequency of reading in the home. Thus, the mothers might know the strategies, but the frequency with which the reading strategies are being utilized was not measured. Future research might benefit from both coding of observations of mother-child reading interactions and mother report of the frequency with which reading occurs in the home.

Though the interactive reading behaviors were reliably coded, it is possible that the ACIRI system is better suited for children older than two years in age. There is minimal published research that has used the ACIRI system, and the research that does exist rarely included children who were under three years in age. Although the manual describes its use with two year olds, it might be that this global rating system is more meaningful in older children. As such, more research is needed to determine whether this system should be applied to children under three. Moreover, this study might have benefited from an interval rating system in conjunction with a global one, such as the ACIRI. An interval rating system would capture the moment-to-moment interactions between mother and child. Some of the nuances of the interaction between the dyads were likely lost and could have hindered prediction having relied solely on a global rating system. In addition, it might have been illuminating to have transcribed

the book-reading task and evaluated qualitative and quantitative (i.e., number of words used in the interaction) features of the interaction. Future research could examine global, interval, and transcription-based data to gain a richer perspective into the shared book reading while evaluating which method yields the greatest prediction.

Another limitation of the current study was attrition. At the first time point, 104 mother-child dyads were assessed. Approximately 20% of the dyads were lost due to attrition from the first time point to the third point, which is when the outcome measure was assessed. Participant attrition likely limited the power of analyses to detect significant relationships between cumulative socio-demographic risk, the home environment, interactive book reading, and children's school readiness. Increased retention of participants as well as recruiting a larger number of participants would increase statistical power necessary for analyses and should be considered in future studies.

Despite these limitations and lack of support for the hypotheses, some interesting findings were uncovered. First, there was a significant negative relationship between single parent status, one of the variables in the risk index, and the school readiness of the children. Children living with single parents scored significantly lower than those living in homes with other adults present on the measure of school readiness. Interestingly, the total interactive book reading score was also significantly negatively related to single parent homes, such that single parents used significantly less interactive book reading behaviors than those living with other adults in the home. One explanation might be that single mothers have fewer resources (i.e., time, finances) than those mothers living with other adults (i.e., romantic partner, family members) in the home that can share in the responsibilities, which impacts access and exposure to cognitive stimulating materials (Thomson, 1994). This also provides additional support for

the importance of considering single parenting as a risk factor and suggests that interventions and resources might be especially important for single mothers.

Maternal education was significantly positively associated with the total interactive book reading behaviors such that mothers with a high school diploma or GED or higher used significantly more strategies than those with less education. This finding also provides support for maternal education as either a potential risk factor or protective factor depending on the mother's education level. This also suggests that the book reading behaviors, which have been found to support language development and learning, are not intuitive and are likely fostered via education and interventions that promote the use of such strategies. Even though the present study found the associations between the interactive reading behaviors and single parent status, and maternal education, the hypotheses related to the interactive reading behaviors were not supported. Future research should focus on understanding and measuring interactive reading behaviors in toddler-aged children so that more can be learned about these behaviors, which previous research has shown to be integral in setting the foundation for children's learning and school readiness.

APPENDIX A

Table 1

Descriptive Statistics of Measures

Measure	*n*	*M*	*SD*
Effortful Control - Child	104	4.73	0.59
Verbal Ability - Mother	96	80.50	12.50
Cumulative Socio-Demographic Risk	104	1.17	0.97
Home Environment	98	16.01	2.59
Total Reading Strategies - Mother	100	1.96	0.49
School Readiness - Child	81	80.60	14.48

Table 2

Correlations

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Effortful Control - Child	--											
2. Verbal Ability - Mother	0.001	--										
3. Gender - Child	0.217*	0.001	--									
4. Cumulative Socio-Demographic Risk	-0.001	-0.048	-0.010	--								
5. Perceived Social Support	-0.027	-0.042	-0.023	-0.395**	--							
6. Neighborhood Dangerousness	-0.060	0.080	-0.074	0.499**	-0.310**	--						
7. Household Overcrowding	0.054	-0.240*	-0.107	0.256**	-0.052	-0.217*	--					
8. Single Parent	-0.064	-0.128	0.032	0.398**	-0.029	-0.023	-0.106	--				
9. Education Level of Mother	-0.004	0.060	0.039	-0.409**	-0.071	-0.088	-0.132	-0.038	--			
10. Home Environment	0.048	0.341**	0.052	0.016	0.047	-0.046	-0.009	0.090	-0.017	--		
11. Total Reading Behaviors - Mother	0.087	0.019	0.004	-0.118	-0.089	0.001	-0.028	-0.197*	0.220*	0.058	--	
12. School Readiness - Child	0.076	0.193	0.139	0.006	-0.160	0.021	0.158	-0.252*	-0.002	-0.036	0.000	--

*p < .05; **p < .01

Table 3

Cumulative Risk, Home Environment, and Reading Behaviors Predicting School Readiness

Predictors	B	SEB	β
Effortful Control - Child	1.94	2.83	0.08
Gender - Child	4.40	3.36	0.15
Verbal Ability - Mother	0.21	0.14	0.18
Cumulative Socio-Demographic Risk	0.29	1.75	0.02
Home Environment	-0.54	0.65	-0.10
Total Reading Behaviors - Mother	0.89	8.26	0.13

Note. All standardized betas were statistically non-significant ($p > .05$).

Table 4

Summary of Hierarchical Regression Analysis for Moderation

Variable	*B*	*SEB*	*β*
Effortful Control - Child	2.25	2.80	0.09
Verbal Ability - Mother	0.22	0.14	0.19
Gender - Child	4.70	3.40	0.16
Cumulative Socio-Demographic Risk	0.45	1.76	0.03
Home Environment	-0.44	0.65	-0.08
Risk x Home Environment	1.25	0.65	0.22
R^2		0.12	
F for change in R^2		3.70	

Note. All standardized betas were statistically non-significant ($p > .05$).

APPENDIX B

Figure 1

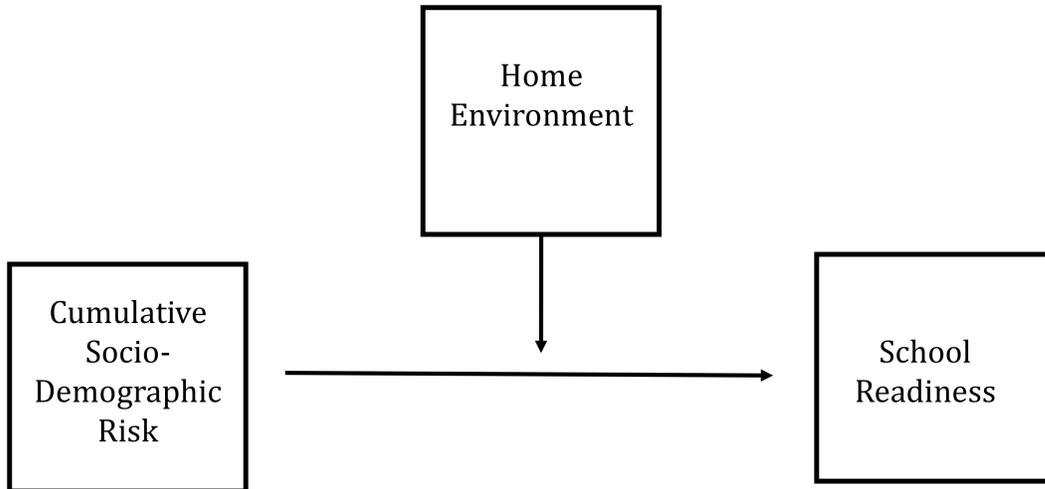*Moderation model tested in the present study.*

Figure 2

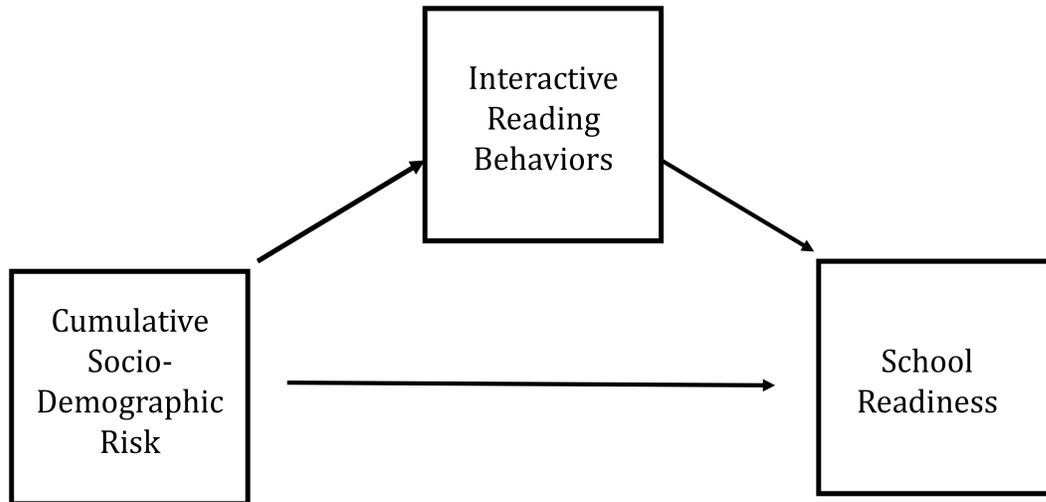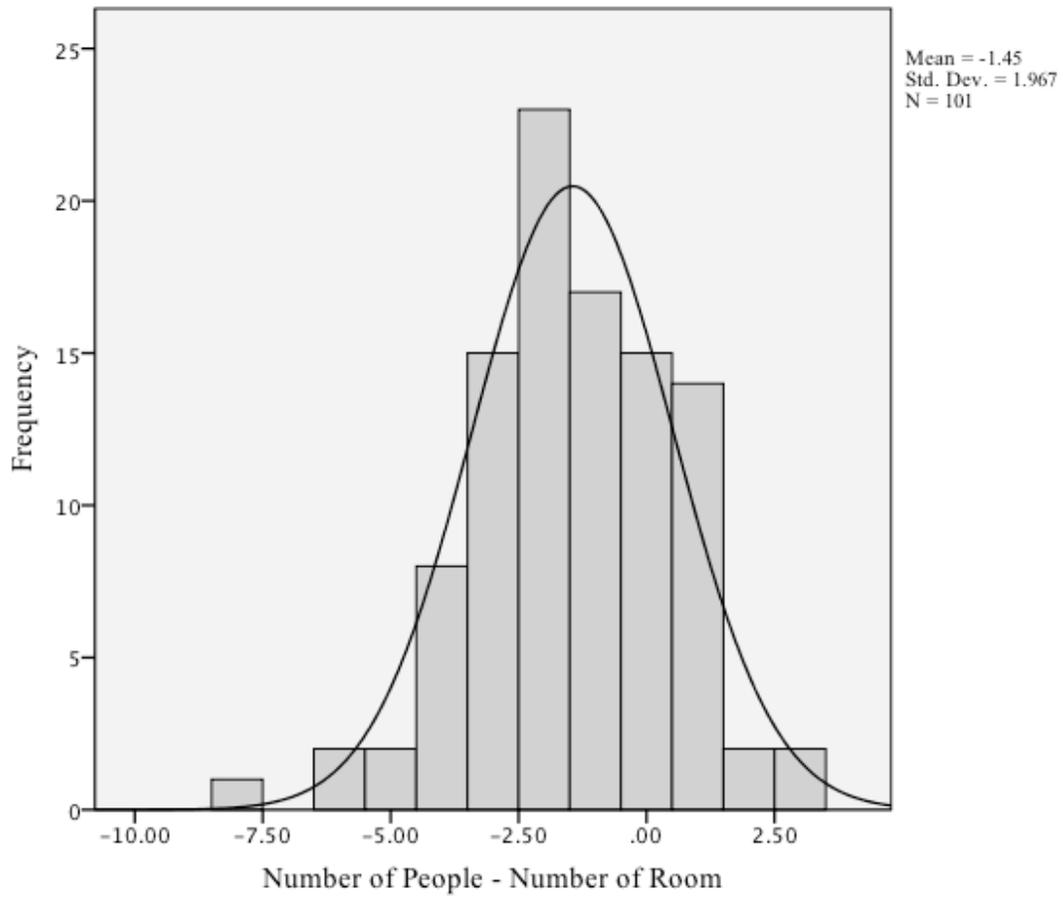*Mediation model tested in the present study.*

Figure 3

Histogram of household overcrowding, which is defined as when the number of people in the

home exceeds the number of rooms, not including hallways and bathrooms.

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ABSTRACT

CUMULATIVE RISK, THE HOME ENVIRONMENT, AND INTERACTIVE BOOK READING BETWEEN MOTHER AND CHILD AS PREDICTORS OF SCHOOL READINESS

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There is evidence in the literature that early school readiness predicts later school performance (Duncan et al., 2007; La Paro and Pianta, 2000). There is less research, however, on the impact of risk factors on a child's school readiness, and protective factors that may lessen the negative effects of various risk factors. This study explored predictors of school readiness, including cumulative socio-demographic risk, the home environment, and interactive book reading behaviors. Participants included 104 young mothers and their children. The mother and child dyads were assessed at three time points. Cumulative socio-demographic risk was measured in the lab when the children were 18 months old. The home environment and interactive book reading were collected at the mothers' homes when the children were 24 months old. The outcome measure of school readiness was collected at the mothers' homes when the children were 36 months old. It was expected that cumulative socio-demographic risk, the home environment and interactive reading behaviors would each predict school readiness. It was also hypothesized that the home environment would moderate the relationship between cumulative risk and school readiness. Finally, it was expected that interactive reading behaviors would

mediate the relationship between cumulative risk and school readiness. Multiple regression and hierarchical linear regressions were used to conduct statistical analyses. Cumulative socio-demographic risk, the home environment, and interactive book reading behaviors were not significant predictors of school readiness, after controlling for child's temperament, gender, and maternal receptive vocabulary. The home environment did not moderate the relationship between cumulative socio-demographic risk and school readiness. Finally, interactive book reading behaviors did not mediate the relationship between cumulative socio-demographic risk and school readiness.

AUTOBIOGRAPHICAL STATEMENT

Laura Northerner was raised in Troy, Michigan and attended college at Wayne State University in Detroit. She is married to Marland Moore and has a son, Samuel. She graduated with a major in English literature and a minor in anthropology, and used this degree to progress from intern, to proofreader, then editorial writer, and eventually marketing specialist for The Henry Ford. After careful deliberation, Laura decided to leave her position as a marketing specialist and return to Wayne State University to complete a second major in psychology. During this time, she sought out numerous research opportunities including serving as a research assistant in a study conducted at the Wayne State University School of Medicine. This study examined graduating medical school class to determine if indicators of humanistic attributes, such as altruism, compassion, empathy, service and respect, can predict specialty choices. Next, Laura worked in the lab of Dr. Antonia Abbey in the Department of Psychology. In this lab, Laura had an opportunity to conduct her own research on insecure adult attachment styles.

Since her acceptance in the Clinical Psychology Doctoral Program at Wayne State University in 2011, Laura has continued to pursue her research and clinical interests. She is involved in the Family Emotion Lab under the supervision of her mentor, Dr. Christopher Trentacosta. Here she completed data collection for a longitudinal study that followed a sample of young at-risk mothers and their toddler children. Additionally, she has experience as a Psychological Services Intern at The Children's Center in Detroit, under the supervision of Dr. Angela Tzelepis. At The Children's Center, Laura is responsible for conducting psychological assessments. She plans to graduate with her Master of Arts in Clinical Psychology from Wayne State University in December of 2013.